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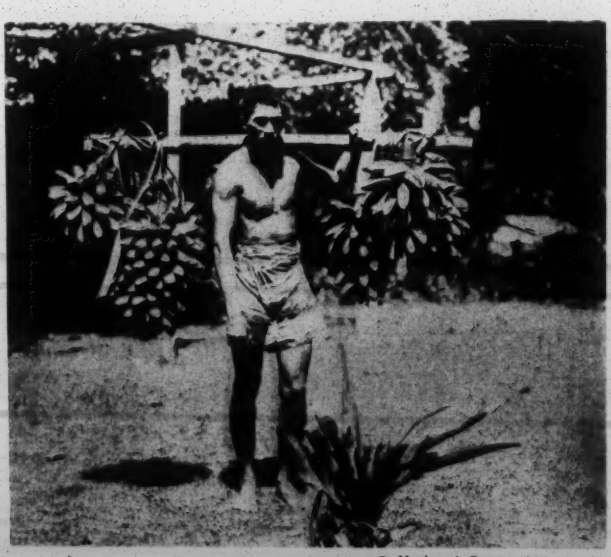

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TAHITIAN WITH A LOAD OF "FEI," A STAPLE ARTICLE OF DIET

(See Bulletin No. 2.)

HOW TO OBTAIN THE BULLETINS

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Expedition to Study Sun as Weather Dictator

WEATHER, which may make or break a farmer—filling his bins and his bank account one year and leaving both empty the next—is to have its mysteries investigated from a new angle. The National Geographic Society and the Smithsonian Institution in cooperation are to conduct an expedition into one of the barren spots of Asia or Africa where an observatory will be established to study the fluctuations in the heat of the sun and their effects on the earth's weather.

At present weather forecasts are made on the basis of temperatures and air pressures existing at various places on the earth's surface. The centers of pressure drift from place to place, as do bodies of cold and hot air, bringing in their train rains, droughts, cold waves and hot spells.

Tests to Continue Four Years

Very often these moving disturbances can be traced and their effects in a certain region foreseen several days in advance. The scientists who are making studies of the sun assert that in thus tracing disturbances of the atmosphere we are merely dealing with effects, and that if we search out the causes instead and grow to understand them we can prophesy weather changes much more accurately and much farther ahead. They see in the sun and in the variations in heat which it sends out the one primary cause of earthly weather; and they are hopeful that after additional investigation they will be able to determine a method of long-range weather forecasting by means of which a farmer can be assured of picking well in advance a proper time for plowing, planting or harvesting, or of taking steps to prevent injury by frosts or droughts.

Observations to Last Four Years

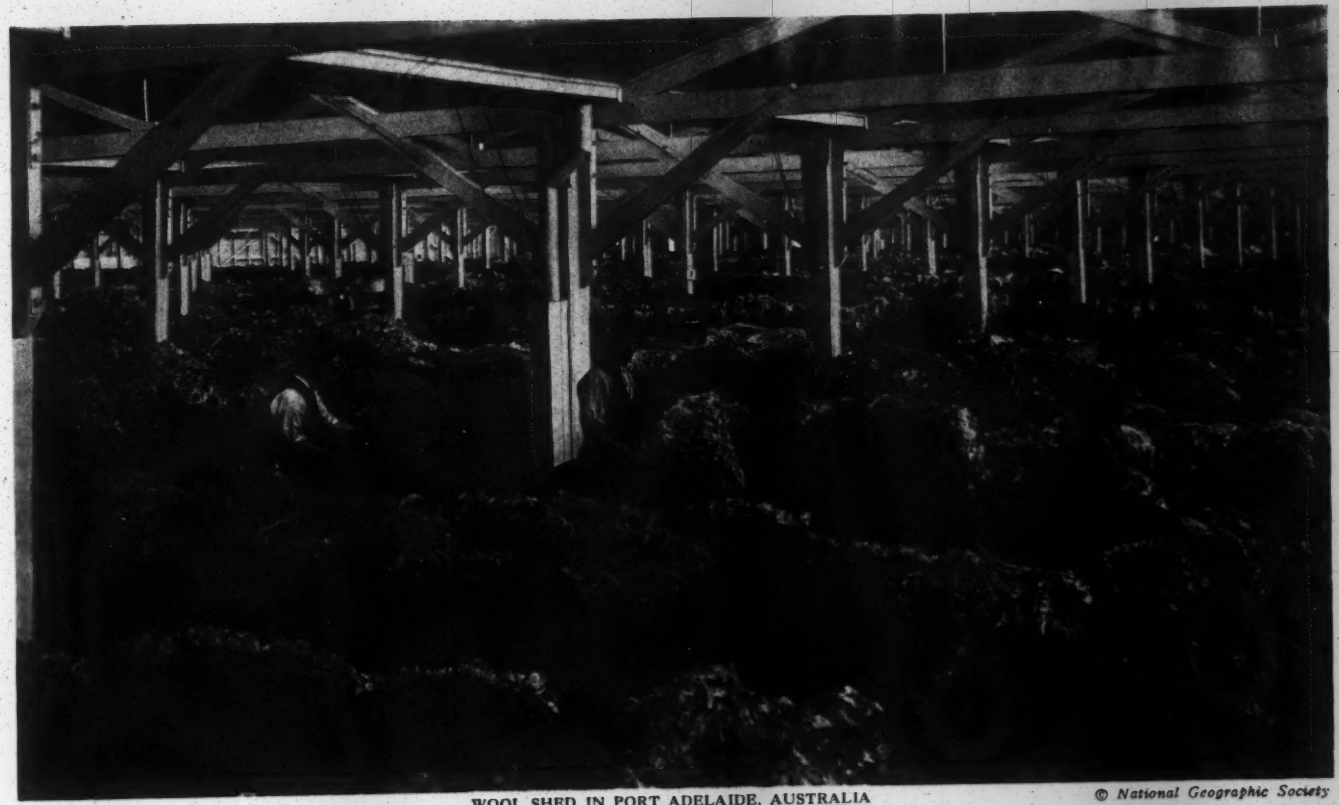
The expedition will be known as "The National Geographic Society's Solar Radiation Expedition, in cooperation with the Smithsonian Institution." Its purpose, as offically defined, is "to carry on for four years daily observations of the solar constant of radiation, in a manner suitable to measure the variation of the sun."

Dr. Charles G. Abbot, Director of the Smithsonian Institution's Astrophysical Observatory, who has been called the Isaac Newton of the laws of the sun, will be the expedition leader.

Sun Has Its Ups and Downs

The work of solar observation has been carried on by Dr. Abbot and his associates at the Smithsonian's Astrophysical Observatory since 1902. At first observations were made for a part of each year at Mount Wilson, California. In 1918 a station was established in the nitrate desert of Chile and, two years later, a station was set up on Mount Harqua Hala, in Arizona, which took over the work previously done at Mount Wilson. The new station will provide data from a part of the world in which daily sun observations have not been made heretofore and will add to the value of the work of the two stations already established.

The idea behind the plan to make long-range weather prophecies from conditions in the sun is a simple one. The sun constantly pours forth a



WOOL SHED IN PORT ADELAIDE, AUSTRALIA

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Wool is one of the chief economic reasons for the existence of Adelaide. Lively scenes mark the auctions in the wool exchanges. The wool sold is contained in big storehouses miles away. About a third of each lot is on the top floor, under bright skylights, each bale open, so that the prospective buyer can inspect each lot before the sale begins and note on his catalogue the price he is willing to bid (See Bulletin No. 5).

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U. S. Fleet Visits Tahiti, Port of South Sea Charm

TAHITI, which was visited by a section of the United States fleet on a cruise to Australia and New Zealand early this fall, is France's most important possession among the South Sea Islands.

Papeete, its chief port, is in turn the metropolis of the southwestern Pacific, "The Honolulu of the South." Because of its position almost midway between Panama and New Zealand, and its reasonable distance—as South Sea distances go—from Samoa, the Marquesas, and Hawaii, Papeete is a sort of ocean cross-roads. Its cosmopolitan aspect never fails to impress visitors. On its wharves and in its streets one encounters vanilla and coconut planters; traders—French, British and American, engaged in every "line" conceivable from copra and silk stockings to fertilizer and pearls; sea captains and shipping agents; French officials (for Papeete is the capital of the French Pacific); missionaries; natives; the everpresent Chinaman; and the nondescript beach-comber.

Tahiti In the Shape of an "8"

Tahiti is of volcanic origin and might be described as a pile of green mountains. The highest peaks tower 7,300 feet above the sea and are smothered in a blanket of rank, tropical vegetation that sweeps to the topmost pinnacle. Even knifelike rock ridges are covered with trees and shrubs that stand out against the skyline like bristling hedges.

Tahiti is made up of two "loops" like a figure "8," one smaller than the other, connected by a narrow neck. The larger unit is about 15 miles across and the two, lengthwise, extend for 30 miles. The forest-covered, mountainous interior is almost uninhabitated, the population being confined to the relatively level strip along the coast. In this strip are the vanilla, coconut, and sugar plantations of the foreigners, as well as the villages of the natives.

Chinese Destroy Islanders' Perfect Peace

There is little to urge a Tahitian to work. Fish may be caught on the coral reefs for the spearing, and breadfruit and fei, a species of banana, can be gathered as needed in the mountains. With the advent of Western methods and an influx of Chinese these easy-going islanders have suffered from a competition they do not understand and their numbers have grown less.

Papeete may be "far from civilization" from the viewpoint of the stay-at-home, but the palate of the visitor to Papeete certainly will not suffer for delectable food. In the bustling port town with its 2,000 French residents, some of them competent chefs, one may find viands that would not be amiss in the restaurants of the Rue de la Paix—from poulet roti to cafe noir. And if he wishes native food he may fare well on cocoanut-fed pig roasted whole, fish with coconut sauce, shrimp, baked banana, and baked breadfruit, the latter with a texture like very fine cheese and an indescribable, mildly pleasant flavor. For dessert he will have oranges, pineapples and various tropical fruits.

stream of waves which generate heat on reaching the earth's atmosphere. The atmosphere absorbs approximately one-quarter of this heat and the rest passes on through to warm the land and the oceans. But the quantity of heat sent out by the sun is not constant. It increases or decreases sometimes as much as 5 per cent in ten days, though usually more slowly. These changes affect the air, the water, and the land, and as a result weather disturbances are brought about.

Sun Spots May Be Earth's Barometer

The most noticeable changes in the heat given off by the sun have been found to be connected with the occurrence of "sun spots"—dark areas that appear on the glowing surface of the solar disk. It becomes possible, therefore, when spots appear near the edge of the sun and advance toward its center, to trace ahead of time the changes in the radiation sent out, or the "variation in the solar constant," as the scientists put it. It is believed that, when careful studies are made of the variations in the solar constant in connection with the earthly weather following these changes, similar weather developments can be predicted many days and perhaps weeks and months ahead. The late Samuel P. Langley, secretary of the Smithsonian Institution, who began the solar heat observations in 1902, even felt that, when the periods of waxing and waning heat from the sun over a number of years were finally worked out, it might not be an extravagant expectation that the modern scientist could parallel Joseph's exploit of Biblical days, and prophesy ahead seven fat years and seven lean.

Send Up Balloons 15½ Miles

To aid in getting the necessary information on which to base the calculations very delicate instruments have been sent up by balloons to such tremendous heights as 15½ miles, where the air is extremely rare.

When the solar constant work was first undertaken it was necessary to observe for several hours and then to follow this by 25 hours of mathematical calculation. Because of the perfection of observing instruments and methods, an observation may now be made in less than 15 minutes, and by the use of special calculating devices built for the purpose, the computations can be made in less than an hour. The solar constant is measured in "calories per square centimeter per minute," a calorie being the amount of heat required to raise a cubic centimeter of water 1 degree in temperature. The constant is found to be nearly 2 calories (1.94). This means that if you could take less than half a thimbleful of water enclosed in a little glass cube (one centimeter or 4/10 inch each way) and transport it to the outer edge of the atmosphere, and could prevent its losing any heat which it gains, the sunbeam striking it would warm it nearly 2 degrees each minute.

Eight Minute Service From the Sun

The light waves that would warm your little cube of water leave the sun just 8 minutes before they reach the edge of the atmosphere. A change in radiation from the sun, therefore, begins to make itself felt very quickly on the earth and in its ocean of air.

It may appear to the layman that if the sun's radiation falls the temperature all over the earth will fall also. The matter is not so simple, however. The effects of solar heat changes are greatly modified in different localities because of local conditions: mountains, deserts, oceans, and established streams of air circulation. Changes in heat may alter winds or create new ones. It is true that the total heat of the earth will fall when the solar constant falls, but in places the temperature at the earth's surface may actually rise when the sun's radiation falls, and vice versa. The field is therefore a very complex one, and detailed studies must be carried out in regard to winds, temperatures, and barometric pressures as well as in regard to sun changes before it will be possible to use the new methods successfully in long-range weather predictions. The new expedition will add to the necessary information in both these fields.

Dr. Abbot will examine possible sites in Morocco, Southwest Africa, and Baluchistan before deciding on the location of the expedition's field station.

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Madagascar: The "Little Continent"

MADAGASCAR is the field of operation of a new American expedition which is now on its way to the French island to unearth more evidence on the origin of Malay races.

Other French colonies like Morocco, Indo-China and Algeria are heard from more often in American newspapers, but Madagascar is important. Geologists have recently discovered indications of oil on the island. A few good oil wells would go far toward making Madagascar known the world around.

Madagascar, lying in the Indian Ocean, is sufficiently far away from Europe and America to be dismissed as a somewhat sizable but isolated island. But on the score of size in comparison with France, it is a case of "the tail wagging the dog." This third largest of the world's islands (leaving polar land masses out of consideration) is larger than France by some 15,000 square miles.

Would Block All U. S. Seaboard

If, instead of being situated off the southeast coast of Africa, Madagascar lay off the southeast coast of the United States it would be easily understood why the island has been referred to as "virtually a little continent." If one end of the island lay in the Atlantic opposite the northern point of Florida, the other end would touch Nova Scotia, blocking practically the entire Atlantic coast of the United States. And if the outer side of the island touched Bermuda the land would extend westward more than half way to Cape Hatteras.

This imaginary position in the Atlantic would not place Madagascar in proper relation to the Equator. It is a tropical island. If placed in a position in the North Atlantic truly comparable to its real position in the southern hemisphere, it would extend from the latitude of southern Florida across the West Indies and the Caribbean Sea to the northern coast of South America. Because Madagascar is in the tropics its low coast lands are hot and malarial. The greater part of its area, however, is a plateau which rises several thousand feet above sea level and furnishes a temperate climate well suited to the needs of Europeans.

Malay Blood Is Dominant Strain

The Malagasies, as the natives of Madagascar are called, are of mixed blood, and Africa has not contributed to the extent that might be inferred from the island's nearness to that continent. The dominant strain seems to have come from the East. Some members of the leading tribes of the central plateau might almost be mistaken for Malays. In other tribes there is a mixture of negro, Arab and even East Indian blood. Many of the Malagasies have reached a considerable degree of civilization, largely due to external influences. First impulses were contributed at a very early date by Arabs, and ever since 1500, when the island was first sighted by Europeans, there have been contacts with Portuguese, Dutch, French and British. Of the three and a half million inhabitants of Madagascar, half a million are rated as Christians.

Since the French declared a protectorate over Madagascar in 1896 and later made it a colony, they have built a railway from Tamatave, chief port, on the eastern coast, to Antananarivo, the capital, near the center of the island. More

Mountains Usually Cloud-capped

The most ambitious sightseeing trip in Tahiti is a circuit of the island by a horse-drawn vehicle, along the coastal strip. This entails the fording of many streams which flow out of the mountains of the interior. Or one may push up one of the many valleys over trails that skirt swift streams and plunge through tunnels of verdure to a mountain top. If one climbs for the view, however, the time must be well chosen, for clouds shroud the mountain summits a large part of the time. The most novel sightseeing trip is made in a small boat to the coral reefs where, through water crystal clear, one may look down upon a beautiful under-sea garden of weird and beautiful growths among which dart brilliantly colored fishes.

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A MINE CAGE DESCENDING A SOUTH AFRICAN GOLD MINE

The wire screen over the cars is to protect the men from falling rocks. Johannesburg is situated directly over the mines which produce half the world's gold supply. It used to be called "the tin town with the gold cellar." It is no longer a "tin" town. It is an impressive city (See Bulletin No. 4).

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The War of Precious Metals

DISCOVERY of new outriders of the famous gold deposits near Johannesburg is reported in news from South Africa. The dispatches are truly field bulletins from a war of precious metals.

Only a few months ago prospectors in South Africa rushed to a new platinum field in another part of Transvaal. Platinum, by commanding a higher price has captured the loyalty and energy of many searchers for gold. Platinum has challenged the rule of gold which has been undisputed monarch of metals since civilization dawned.

Platinum has not won the war of precious metals—not by a great margin. Except in the Orient, the world's monetary system is still a loyal thrall to its liege lord, gold. Twice platinum has failed in the attempt to lure Russia to desert gold. In 1828 Czarist Russia tried platinum coinage, only to give it up in 1845. Soviet Russia announced that platinum, the pretender, would back its currency, but recently the Soviet has returned to the gold standard.

A 50,000-Mile Invisible Strand

Each contender in the battle of metals is versatile, and is outstanding in those qualities of character for which metals are admired. Not the least of their trials of strength have been held in the arenas of modern chemical laboratories. Gold proudly maintains it can spread itself out more than any other metal. An ounce of gold beaten into gold leaf will cover 189 square feet! Platinum counters with the challenge that it can stretch farther than any other known metal. A cubic inch of platinum drawn into wire, practically invisible to the human eye, would make a strand of wire 50,000 miles long. In other words, one cubic inch of platinum can be stretched out to encircle the earth at the equator twice!

Both platinum and gold resist corrosion in ordinary atmosphere. Both are malleable, but here gold has the advantage. Both are heavy metals but platinum "weighs in" slightly heavier. Platinum was once thought to be the only substance which could not be dissolved. Later investigations prove that aqua regia (nitric and hydrochloric acid) can conquer it, but its resistance entitles it to an important place in scientific and laboratory work. Gold melts at 1,945 degrees Fahrenheit, platinum at 3,191 degrees.

Platinum a Chemical Middleman

Platinum is an important catalyzer, that is, a chemical middleman. This property alone probably served to prolong the World War two or three years more than it lasted. As a catalyzer, platinum helped make nitrates out of nitrogen in the air. Germany was cut off from Chilean nitrates during the war, and if it had not been for the supply she secured through the offices of electricity and platinum, she would have run out of explosives long before 1918.

If Lyndenberg in the Transvaal proves a good field, platinum will find quick use for it to fill in a big gap in her lines, for the original major source of the precious metal is running out. Before 1914 more than 90 per cent of the world's platinum came out of the Russian mines near Ekaterinburg, in the Ural Mountains. But the best gravels there have been worked and now the world looks to Colombia in South America. Other deposits are known, some even

than 1,500 miles of highways have been constructed. Huge areas of the island are without roads, however, and considerable regions are virtually unexplored. Many of the people of the back country are pagans and many primitive customs exist among them.

Two Head of Cattle Per Person

Madagascar is surpassed by few lands as a cattle country. There are nearly eight million head of cattle, more than two for every human inhabitant. Thousands of wild cattle roam the plains and forests, and hunting them is the great Madagascan sport. The chief vegetable staple is rice.

Production already exceeds consumption, and the island could become one of the great rice exporting regions of the world. But this is only a beginning. Almost every tropical product, elsewhere valuable, flourishes, together with many temperate zone products. There are rubber, coffee, tea, vanilla, cacao, sugar, silk worms, silk spiders, tobacco, raffia, cabinet woods, bananas, and a long list of tropical fruits and vegetables. Hides and preserved meats are important exports.

Natives Eat Spiders, Silkworms, Locusts

One fly in the Madagascan ointment is the existence of hordes of locusts. Myriads of them settle in certain regions and destroy all crops and foliage. But such a visitation never means a famine in Madagascar. With an ability to make the best of a bad bargain that almost amounts to genius, the Malagasy "harvests" the crop of locusts, eats what he needs, and dries the rest for use as future food. Dried locusts are a food staple, like the northerner's dried fish, sold in every market and "put up" by every careful housewife.

There is a fat spider of which the Malagasy is also very fond, and he even eats silk worms with relish. One white traveler who journeyed into the Madagascan back country in a chair borne by carriers, asserts that one of the most delicious of the native dishes is a stew consisting of locusts, spiders, worms, rice, fish and suet.

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Adelaide: Proposed Terminal of a Great Railroad

ADELAIDE, capital of South Australia, is now practically certain of selection as the terminal of Australia's projected railroad connecting the south and north shores of that continent.

Australia made a forward step when it bridged the great interior desert and tied the east and west coast together with a 4,317-mile transcontinental railroad. Now the desert is to be crossed again; this time from Adelaide in the south to Darwin on the north coast. When this railroad is completed ribbons of steel will tie up Australia like a candy box.

Adelaide and Port Adelaide

Adelaide is the only great city in Australia not directly on the coast. It was established 6 miles up the Torrens River from St. Vincent Gulf. Almost simultaneously, however, Port Adelaide was built some 6 miles from the city and 7 or 8 miles up the coast from the river's mouth. Connected with the city, first by highways and later by rail, the port is now practically a part of Adelaide. The situation is not unlike that of Los Angeles, also established inland, which has built its port on the nearest salt water; or like that of Lima, Peru, which has its port, Callao, 8 miles distant.

Adelaide is the third city in size in Australia, being surpassed only by Sydney and Melbourne. Its population of about 260,000 makes it comparable to Portland, Oregon, or Denver. It is well built and is particularly rich in parks. One unique feature is the ringing round of the business district by a zone of park land beyond which lie the residential sections. Wide streets and substantial buildings, combined with the parks, give Adelaide at once the appearance of a thriving mart of trade and a substantial home city.

Central City of Fertile Plain

Adelaide owes much to its immediate surroundings. It is set down in a vale of plenty. The plain of Adelaide, which surrounds the city and extends up and down the coast, is a level and fertile region closely packed with farms and gardens. Back of this 15-mile strip, about 7 or 8 miles from the city, rises the Mt. Lofty range of hills, affording excellent pasturage. The gentler slopes are used for fruit growing and wine production. In the rougher portions of the hills many prosperous Adelaidians have built summer homes.

Parks do not stop with Adelaide's municipal limits. Numerous national parks and reservations have been set apart in the hills. Good highways connect them with the city and a "Government Tourist Bureau" operates motor busses to these pleasure spots, making them accessible for small fares. In the other direction Adelaide has a bevy of seaside resorts within easy reach.

Adelaide's pride in its citizenry is based somewhat on the fact that it was the first Australian colony to be started directly from England with other than convicts. The selection of a site around the southeast corner of the continent from the existing settlements, and 600 miles westward along the southern coast, gave the new colonists an isolation that produced a marked individuality before

in the United States, but the stores are slim any place. Platinum, like most natural resources, is no respecter of man-made border lines and is apparently not even particular about the continent where it takes up lodging.

Radium Most Precious Metal

Neither platinum nor gold is the most precious metal, in the estimation of the world. That honor is reserved for radium, which has been recently reduced in price to $70,000 per gram, a price equivalent to $2,100,000 per ounce. Iridium, a companion of platinum, is the second most expensive metal in general use. It is selling for $375 per ounce, and the demand for it is very active because it is compounded with platinum for jewelry. Platinum is selling for well over $100 per ounce.

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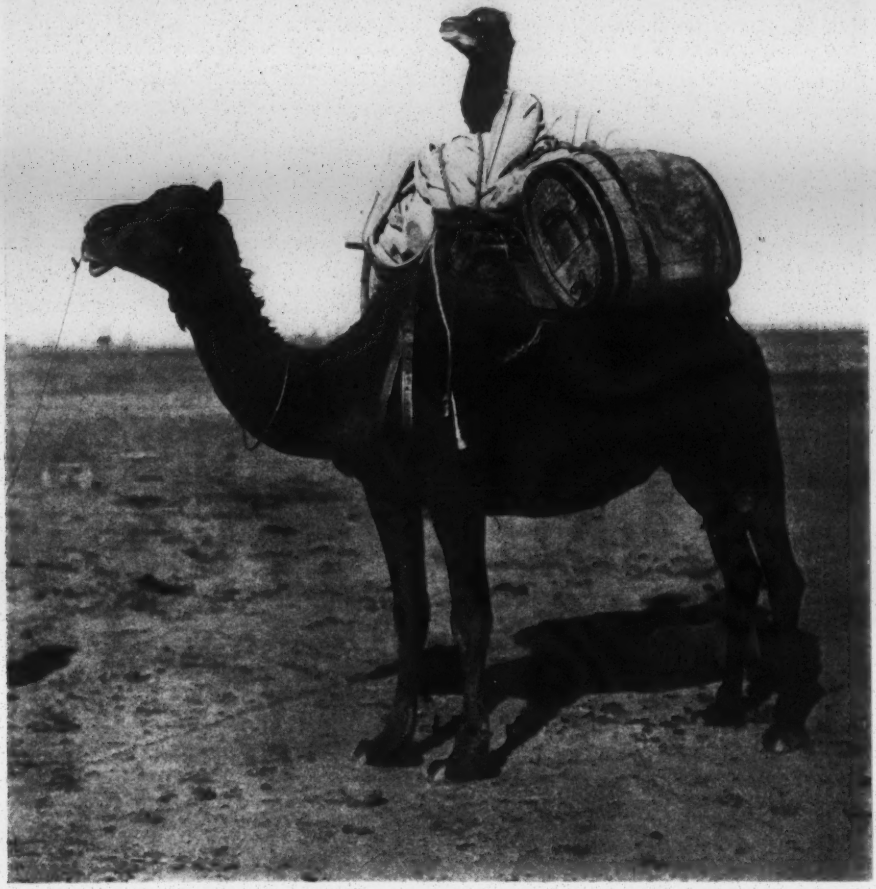

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GETTING A FREE RIDE ON THE AUSTRALIAN DESERT

Camels have been successfully introduced on the great Australian desert to carry produce and supplies overland. The proposed north and south transcontinental railroad line will eliminate much hard, tedious caravan travel. Wobbly legs of baby camels sometimes fail them on the long marches so they have to be carried (See Bulletin No. 5).

railroads came along to bind them back again as neighbors to New South Wales and Victoria.

Founded In Year Texas Won Independence

Americans can gauge Adelaide's age by the fact that it was founded while our own pioneers were forging westward planting cities of their own. It had its beginning in 1836, the year in which colonists in our Southwest wrested Texas from Mexico, in which Arkansas became a state, and during the period when St. Louis was making its first marked growth under American influence. To British ears its name, too, fixes its birth date, for it was named for Queen Adelaide, consort of William IV, whose death in 1837 placed Queen Victoria on the British throne.

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AN ASTRONOMER GOING FROM HIS WORK AT YERKES OBSERVATORY

Personal discomfort never daunts men who are seeking the secrets of the sun, moon, planets and stars. There is a standing rule that astronomers at Yerkes must stop work in the unheated dome of the big telescope when the thermometer reaches 25 degrees below zero; but if the "seeing" is good the observers break the rule (See Bulletin No. 1).